

## WHAT IS CLAIMED IS:

1. A reactor plate, comprising:

a substrate with an array of reaction cells; and

a permeable film covering at least one of the cells to selectively permit transport of a reactant gas into the one cell while preventing transport of a reaction product out of the cell.

2. The reactor plate of claim 1, wherein the film is characterized by a diffusion coefficient of about  $5 \times 10^{-10}$  to about  $5 \times 10^{-7}$  cc(STP)-mm/cm<sup>2</sup>-sec-cmHg.

3. The reactor plate of claim 1, wherein the film is characterized by a diffusion coefficient of about  $1 \times 10^{-9}$  to about  $1 \times 10^{-7}$  cc(STP)-mm/cm<sup>2</sup>-sec-cmHg.

4. The reactor plate of claim 1, wherein the film is characterized by a diffusion coefficient of about and preferably about  $2 \times 10^{-8}$  to about  $2 \times 10^{-6}$  cc(STP)-mm/cm<sup>2</sup>-sec-cmHg.

5. The reactor plate of claim 1, wherein the film is about .0002 to about .05 mm thick.

6. The reactor plate of claim 1, wherein the film is about .005 to about .04 mm thick.

7. The reactor plate of claim 1, wherein the film is , desirably about .01 to about .025 mm thick.

8. The reactor plate of claim 1, wherein the film is a polycarbonate, perfluoroethylene, polyamide, polyester, polypropylene or polyethylene.

9. The reactor plate of claim 1, wherein the film is a polycarbonate, PET or polypropylene.

10. The reactor plate of claim 1, wherein the film is a monofilm, coextrusion, composite or laminate.

11. The reactor plate of claim 1, wherein the film selectively admits transport of a reactant and prohibits transport of a reaction product.

12. The reactor plate of claim 1, wherein the film selectively admits transport of oxygen and carbon monoxide and prohibits transport of a diaryl carbonate.

13. The reactor plate of claim 1, wherein the at least one cell is a shallow cell.

14. The reactor plate of claim 1, wherein the at least one cell is a cell with two opposing walls comprising permeable film.

15. The reactor plate of claim 1, wherein the at least one cell is a cell is formed from a polycarbonate substrate with two opposing walls comprising permeable polycarbonate film

16. The reactor plate of claim 1, wherein the at least one cell is a concave bottomed cell with permeable film cover.

17. A method, comprising:

providing a reactor plate comprising a substrate with an array of reaction cells, at one least one cell of the array comprising a cavity and a permeable film cover; and

conducting a combinatorial high throughput screening (CHTS) method with the reactor plate.

18. The method of claim 17, wherein the CHTS method comprises a step of (a) reacting a reactant under a set of catalysts or reaction conditions; and (b) evaluating a set of products of the reacting step.

19. The method of claim 17, comprising providing a cell according to permeability of the film and robustness and rate of the reacting step.

20. The method of claim 17, comprising providing a cell so that rate of diffusion of gas through the membrane is greater than the rate of gas uptake of the reaction in the reacting step.

21. The method of claim 17, wherein the CHTS method comprises (A) an iteration of steps of (i) selecting a set of reactants; (ii) reacting the set and (iii) evaluating a set of products of the reacting step and (B) repeating the iteration of steps (i), (ii) and (iii) wherein a successive set of reactants selected for a step (i) is chosen as a result of an evaluating step (iii) of a preceding iteration.

22. The method of claim 17, wherein the CHTS method comprises (A) (i) simultaneously reacting reactants, (ii) identifying a multiplicity of tagged products of the reaction and (B) evaluating the identified products after completion of a single or repeated iteration (A).

23. The method of claim 17, wherein the CHTS method comprises (a) reacting a reactant under a set of catalysts or reaction conditions; (b) evaluating a set of products of the reacting step; and reiterating (a) according to results of the evaluating (b).

24. The method of claim 17, wherein the CHTS method comprises (a) reacting a reactant at a temperature of about 0 to about 150°C.

25. The method of claim 17, wherein the CHTS method comprises (a) reacting a reactant at a temperature of about 50 to about 140°C.

26. The method of claim 17, wherein the CHTS method comprises (a) reacting a reactant at a temperature of about 75 to about 125°C.

27. The method of claim 17, wherein the CHTS method comprises effecting parallel chemical reactions of reactants or catalysts within reaction cells of the array.

28. The method of claim 17, wherein the CHTS method comprises effecting parallel chemical reactions on a micro scale on reactants or catalysts within reaction cells of the array.

29. The method of claim 17, wherein the CHTS method comprises effecting parallel chemical reactions on catalyst systems within reaction cells of the array with reactants that permeate through the film cover.

30. The method of claim 29, wherein at least one catalyst system comprises a Group VIII B metal.

31. The method of claim 29, wherein at least one catalyst system comprises palladium.

32. The method of claim 29, wherein at least one catalyst system comprises a halide composition.

5 33. The method of claim 29, wherein at least one catalyst system comprises an inorganic co-catalyst.

34. The method of claim 29, wherein at least one catalyst system comprises a combination of inorganic co-catalysts.

10 35. The method of claim 17, further comprising depositing a reactant within the at least one cell and effecting a chemical reaction of the reactant with carbon monoxide and oxygen that permeates through the film.

36. The method of claim 35, wherein the film is a polycarbonate, PET or polypropylene.